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Development of a New Geometrical Form of Micropipette by Means of Micromachining Techniques

Paulo Jose Abatti and Toyosaka Moriizumi*

Department of Electrical and Electronic Engineering,
Tokyo Institute of Technology
2-12-1, Ohokayama, Meguro-ku, Tokyo 152, Japan

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The construction of a new geometrical form of micropipette was accomplished by implementing a microfabrication method that allowed the transference of a Si_3N_4 film with a hole from the Si substrate to a glass tube tip. The main part of the fabrication method is the sealing process: a mix between thermal and anodic bonding. By adequately choosing the experimental conditions, this two-step bonding method can be used to build a high-strength seal with a marked reduction of void regions, without changing the shape and dimensions of the parts that make up the joint. The micropipette fabrication is described in detail with emphasis on the thermal-anodic bonding process. In addition, a brief account of the new device main features including two examples of applications is given.

1. Introduction

The field-assisted, or anodic bonding, technique[1] has attracted the interest of the semiconductor device industry (in particular, the sensor industry), and has been the subject of extensive research and applications[1–5]. However, among the fabrication possibilities that anodic bonding has opened up, the transference of thin solid films grown on metal or semiconductor to glass substrates could not be fully accomplished because the bonding quality is strongly dependent on such factors as the

*To whom correspondence should be addressed.